

## IMAGE REFINING AND TRACKING

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**Abstract:** Now days in every organization like crime prevention, industrial processes, traffic monitoring, transport safety, control of retail, etc. CCTV cameras are used. In our system we use the videos which are captured by CCTV cameras but to identify the object clearly we divide the videos into the frames. That frames are trying to match with the database images by using face recognition laplacian algorithm. The system is developed in such a way that the customer has to enter image, search, indexing is performed and then start comparing the images one by one. So the set of similar images are displayed. The top rank similar images are then presented to the user. This project is mainly designed considering the scenarios for comparing the images. It is used for image comparison which fulfills exact requirements according to the user Content Based Image Retrieval (CBIR) – the application of computer vision to the image retrieval. CBIR aims at avoiding the use of textual descriptions and instead images based on their visual similarity to a user-supplied query image or user-specified image. **CBIR** "Content-based" means that the search will analyze the actual contents of the image. The term 'content' in this context refer to colors, shapes, textures as well as the image is sharpen, blurred, edge detect and reset. This report reviewed the main components of a content based image retrieval system, including image feature representation, indexing, query processing, and query-image matching and user's interaction.

**Keywords:** CBIR, QBIC, CBVIR.

### 1. INTRODUCTION

The main objective of Image Refining and tracking is to enhance the quality of the images and videos which are captured by the CCTV cameras. These CCTV cameras can be used for Crime prevention, Industrial processes, Traffic monitoring, Transport safety, Control of retail. various approaches for object tracking have been proposed. These primarily differ from each other based on the way they approach the following question: which object representation is suitable for tracking? Which image features should be used? How should the appearance and shape of object be modeled? The answers to these questions depend on the context/environment in which the tracking is performed. A large number of tracking

methods have been proposed which attempt to answer these questions for variety of scenarios. Human interactive systems have attracted especially for content-based image retrieval systems. In this paper, we focus on the retrieval of concepts within a large image collection. We assume that a user is looking for a set of images, the query image, within a database. The aim is to build a fast and efficient strategy to retrieve the query Concept. In content-based image retrieval (CBIR), the search may be initiated using a query as an example. The top rank similar images are then presented to the user. This system work by comparing images and assessing similarity through the application of feature extraction techniques, based on shape, color and texture. [6]

## 2. IMAGE RETRIEVAL

An **image retrieval** system is a computer system for browsing, searching and retrieving images from a large database of images.

### 3. CBIR

Content-based image retrieval (CBIR), also known as query by image content (QBIC) and content-based visual information retrieval (CBVIR) is the application of computer vision to the image retrieval problem, that is, the problem of searching for images in databases.

"Content-based" means that the search will depend the actual contents of the image. The term 'content' means nothing but colors, shapes, textures, or any other information that can be derived from the image itself.

#### 3.1 Image indexing

Image indexing is achieved by (manually) assigning classification codes to each image, and then uses these as retrieval keys. Examples of image indexing schemes include the usefulness of text based indexing by the need to an external source to provide relevant images about a given image. This encourages the possible use of user-based indexing in many current CBIR systems. Research on effective ways to index images by content has been largely on efficient visual representation and similarity measures.

#### 3.2 Texture

Texture is another important property of images. It refers to the visual patterns that have properties of arrangement that do not result from the presence of only a single color or intensity. Various texture representations have been identified in pattern recognition and computer vision.

## 4. MATCHING QUERY TO IMAGE

First, one identifies that the query-image matching model is very much linked to the type of features used to represent the images. One distinguishes at least three cases Feature

- Vector representation where each component of the vector represents the value of a specific item or attribute of the image feature, say  $V_i = [x_1 \ x_2 \ \dots \ x_d]$  where  $d$  stands for number of attributes. For instance in case of grey-level color histogram, a component  $k$  represents the number of pixels whose values fall within the range specified by the  $k^{\text{th}}$  bin.

- Region based representation where a set of vectors, possibly with different size, is used instead of a single vector. A typical example includes color segmentation, where, for instance, the image is split into four parts and the color histogram of each part is reported.

#### 4.1 Feature vector representation

In case of vector-based representation, the use of feature vector  $V_i = [w_1^i \ w_2^i \ \dots \ w_d^i]$  of image  $i$  of the database and  $V_q = [q_1 \ q_2 \ \dots \ q_d]$  of the query  $q$ , the matching can be computed as a quantification of some similarity measure between  $V_i$  and  $V_q$ . Examples of such similarities include [7].

- Cosine similarity calculated as inner product of  $V_i$  and  $V_q$

$$Sim(V_i, V_q) = \sum_{k=1, d} w_k^i q_k$$

- Euclidean distance from  $V_i$  and  $V_q$

$$Sim(V_i, V_q) = \left[ \sum_{k=1, d} (w_k^i - q_k)^2 \right]^{1/2}$$

- Weighted Euclidean distance based on some weight matrix  $W$

$$Sim(V_i, V_q) = V_i \cdot W \cdot V_q^T$$

#### 4.2 Region-based representation

In this case, a set of vectors, say,  $V_i^k$  ( $k=1$  to  $m$ ) were used to represent image  $i$ . Intuitively, the metric based similarity approach used in case of feature vector representation can also be extended to a set of vectors using Hosdorff distance; that is,

$$d(V_i, V_q) = \max(\max_{r=1, k} \min_{j=1, l} d_L(V_i^r, V_q^j), \max_{j=1, l} \min_{r=1, k} d_L(V_i^r, V_q^j))$$

Strictly speaking, the use of Hosdorff distance, although mathematically very appealing, it does not allow the system to incorporate some local constraints in terms of preference among different elements of the set vectors. This motivated the use of weighted distance as [7].

$$d(V_i, V_q) = \sum_{r, j} w_{rj} d_L(V_i^r, V_q^j)$$

#### 4.3 Laplacian algorithm

The algorithmic procedure of Laplacian faces is formally stated below:

1. **PCA projection:** We project the image set  $\{x_i\}$  into the PCA subspace by throwing away the smallest principal components. In our experiments, we kept 98% information in the sense of reconstruction error. For the sake of simplicity, we still use  $x$  to denote the images in the PCA subspace in the following Steps. We denote by  $W_{PCA}$  the transformation matrix of PCA.
2. **Constructing the nearest-neighbor graph:** Let  $G$  denotes a graph with  $n$  nodes. The  $i^{th}$  node corresponds to the face image  $x_i$ . We put an edge between nodes  $i$  and  $j$

if  $\mathbf{x}_i$  and  $\mathbf{x}_j$  are “close”, i.e.  $\mathbf{x}_i$  is among  $k$  nearest neighbors of  $\mathbf{x}_j$  or  $\mathbf{x}_j$  is among  $k$  nearest neighbors of  $\mathbf{x}_i$ . The constructed nearest neighbor graph is an approximation of the local manifold structure. Note that, here we do not use the  $\epsilon$  - neighborhood to construct the graph. This is simply because it is often difficult to choose the optimal  $\epsilon$  in the real world applications, while  $k$  nearest neighbor graph can be constructed more stably. The disadvantage is that the  $k$  nearest neighbor search will increase the computational complexity of our algorithm. When the computational complexity is a major concern, one can switch to the  $\epsilon$  - neighborhood.

3. **Choosing the weights:** If node  $i$  and  $j$  are connected, put

$$S_{ij} = e^{-\frac{\|\mathbf{x}_i - \mathbf{x}_j\|^2}{t}}$$

Where  $t$  is a suitable constant. Otherwise, put  $S_{ij} = 0$ . The weight matrix  $S$  of graph  $G$  models the face manifold structure by preserving local structure. The justification for this choice of weights can be traced back to [3].

4. **Eigenmap:** Compute the eigenvectors and eigenvalues for the generalized eigenvector problem

$$XLX^T \mathbf{w} = \lambda DX^T \mathbf{w} \quad (1)$$

where  $D$  is a diagonal matrix whose entries are column (or row, since  $S$  is symmetric) sums of  $S$ ,

$D_{ii} = \sum_j S_{ji}$ .  $L = D - S$  is the Laplacian matrix. The  $i$ th row of matrix  $X$  is  $\mathbf{x}_i$ .

Let  $\mathbf{w}_0, \mathbf{w}_1, \dots, \mathbf{w}_{k-1}$  be the solutions of equation (1), ordered according to their Eigen values,  $0 \leq \lambda_0 \leq \lambda_1 \leq \dots \leq \lambda_{k-1}$ . These Eigen values are equal to or greater than zero, because the matrices  $XLX^T$  and  $DX^T$  are both symmetric and positive semi-definite. Thus, the embedding is as follows:

$$\mathbf{x} \rightarrow \mathbf{y} = W^T \mathbf{x}$$

$$W = WPCAWLPP$$

$$WLPP = [\mathbf{w}_0, \mathbf{w}_1, \dots, \mathbf{w}_{k-1}]$$

Where  $\mathbf{y}$  is a  $k$ -dimensional vector.  $W$  is the transformation matrix. This linear mapping best preserves the manifold’s estimated intrinsic geometry in a linear sense. The column vectors of  $W$  are the so called *Laplacian faces*.

## 5. FLOWCHART

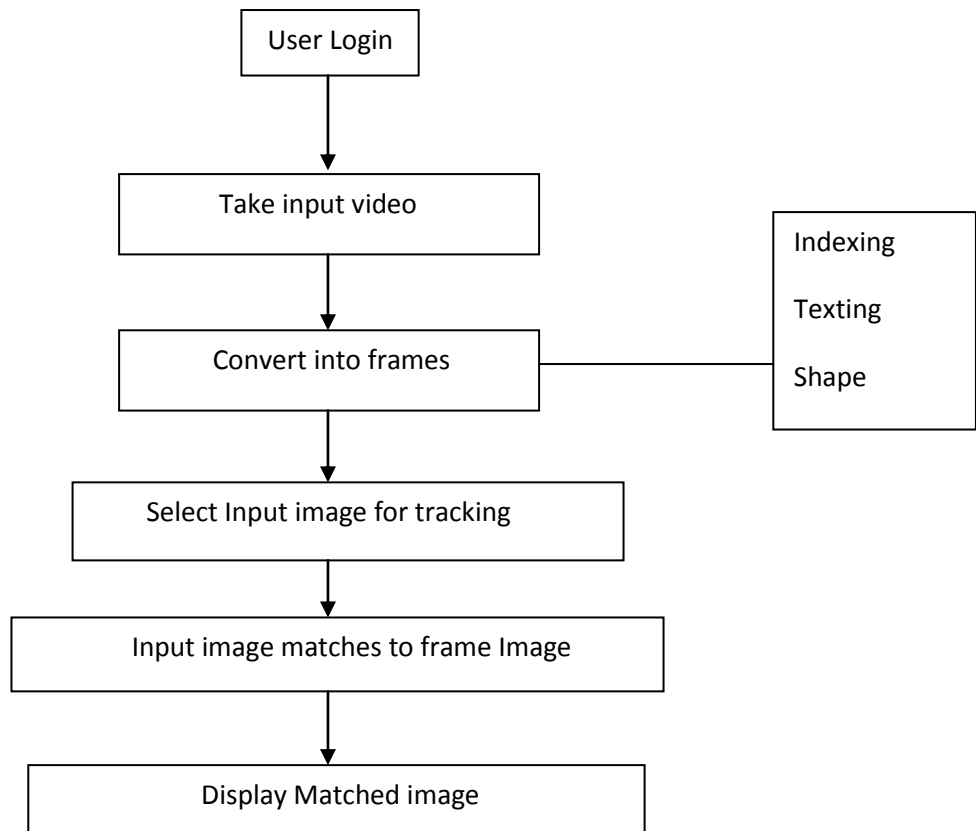


Fig.1: Flowchart of project

## 6. CONCLUSION

The project has succeeded in achieving most of its goals, in that it has created a working system capable, to an extent, of retrieving images based on their content as well as automatically annotating images with varying success. The processes described have been shown to function in the manner expected, and the method by which they combine has produced a powerful tool, suitable for the purposes the project was intended for. The results of this project are searching the query images to database image & relevant images are displayed.

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